DOCUMENT RESUME

ED 271 498 TM 860 407

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TITLE Test Scores and the Graduate Admission of Older Students.
PUB DATE Apr 86
NOTE 27p.; Paper presented at the Annual Meeting of the American Educational Research Association (70th, San Francisco, CA, April 16-20, 1986).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Adults; *College Entrance Examinations; Comparative Analysis; *Grade Prediction; Graduate Students; *Graduate Study; Higher Education; Mathematics Skills; Middle Aged Adults; Predictive Measurement; *Predictive Validity; Questionnaires; *Scores; Surveys; Test Validity; Test Wiseness; Verbal Ability
IDENTIFIERS *Graduate Record Examinations

ABSTRACT

This paper examined test scores and information about test takers collected from the Graduate Record Examination (GRE) national test administration files, GRE validity study data provided by institutional users, and survey questionnaires sent to test repeaters. Data were collected from 200,000 men and women who took the GRE General Test in June 1980-81 and from almost 900 persons who repeated the GRE General Test in June 1980. In both studies data were examined separately for four age groups of test takers--age 22 or less, 23-29, 30-39, and 40 or more--and two groups returning to graduate study after the bachelor's degree--those 9 to 15 years beyond the baccalaureate, and those 16 or more years beyond the undergraduate degree. Research concluded that early- and middle-aged adults taking the GRE General Test earn verbal ability scores similar to scores of younger applicants interested in the same fields of graduate study, while average quantitative scores are lower for test takers age 30 or older than for those age 20-22 in almost every field. Both scores predict first-year graduate school grades with approximately equal accuracy for all age groups. Among test repeaters, test preparation seemed more closely related to score changes than any other factor investigated. (PN)

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TEST SCORES AND THE GRADUATE ADMISSION OF OLDER STUDENTS

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According to a national survey of adult career counseling needs, as many as 60% of adult Americans plan to seek additional education to prepare them for career entry and advancement (Arbeiter, Aslanian, Schmerbeck, & Brickell, 1978.) At least one projection of college enrollments (Bowen, 1980) anticipates that the number of enrolled adults age 30 or more will equal the enrollments of 18-21 year olds by 1988. Many of these adult students will be completing undergraduate degrees or taking courses for particular purposes without regard to degrees. But many of them, particularly those desiring to change or update careers, will be enrolling in graduate or professional degree programs.

A recent survey of graduate admission practices (Oltman & Hartnett, 1984) indicates that 64% of all U.S. graduate programs require or recommend submission of GRE General Test scores as part of the admission process (57% of more than 7000 master's degree programs and 75% of almost 5500 doctor's degree programs.) When asked how GRE scores were

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Presented at the American Educational Research Association annual meeting, April 1986, San Francisco.

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used in admission, only three percent of questionnaire respondents indicated special consideration in the admissions process for older or returning applicants.

The increasing number of adults returning to graduate study and the frequent use of GRE test results in the admission and advising of the students desiring graduate degrees raise a number of questions about how older applicants perform on the test. Do older and younger applicants applying for admission to programs in the same field score about the same on the GRE General Test? Are there sex or race differences in the scoring patterns of older test takers? What about retaking the test after a number of years--are scores likely to be higher or lower? What reasons do adults give for retaking the test and how do they feel about the testing experience? These are some of the questions that stimulated recent analyses of test scores and information about test takers from GRE national test administration files, GRE validity study data provided by institutional users, and survey questionnaires sent to test repeaters.

Most of the results reported in this paper are drawn from studies of more than 200,000 men and women who took the GRE General Test in 1980-81 (Clark, 1984) and of almost 900 persons who repeated the GRE General Test in June 1980 (Powers & Clark, 1985.) In both studies the results were examined separately for four age groups of test takers--those age 22 or less, 23-29, 30-39, and 40 or

more--and two groups returning to graduate study many years after completing the bachelor's degree--those 9-15 years beyond the baccalaureate, and those 16 or more years beyond the undergraduate degree. Where possible, the results also were examined separately by sex, race or ethnic identification, and intended field of graduate study.

Characteristics of Test Takers

Of 1980-81 GRE test takers, more than 40,000 or about 21% were at least 30 years old and 5% (9,600) were 40 years old or older (Clark, 1984.) This represents an increase from 15% to 21% in the five years since 1975-76, consistent with the growing number of older persons interested in applying to graduate school. More than half of those over 30 were registering to take the GRE 9 years or more after completing their undergraduate degrees; more than half of those over 40 were planning to take the test 16 years or more after the baccalaureate degree. Older examinees also differed from the younger ones in other ways: More had already pursued some graduate study (20% with master's degrees, almost half with some graduate study); more were women (about 60% vs. about half of the younger group); the percentage of non-whites was slightly higher (15% vs. 13%); and more of the older group expected to undertake graduate study in education (about 32% vs. 12%) while fewer had graduate study plans in the biosciences, engineering, or physical sciences (about 5% vs. 18%.)

The older group of test takers also can be differentiated according to whether they are "returners" or "late bloomers", defining the "returners" as those who completed their undergraduate degrees at the usual age of 21 or 22 and who are now coming back for further study, and the "late bloomers" as those who recently completed a bachelor's degree and are continuing relatively directly into graduate study.

Finally, in addition to differences in the recency of experience in taking tests and, perhaps, the quality of their undergraduate education, both of the older groups may differ from younger examinees in the quality of their elementary and secondary education, their attitudes and motivations concerning tests, and their experiences accumulated through the course of day-to-day living (Stricker & Rock, 1985.) These and other differences associated with age or generation may affect performance on the GRE General Test even though the examinees can be assumed to be highly motivated and self-selected to take the test at this point in their lives.

GRE Test Scores of Adults

Figure 1 graphs the 1980-81 GRE verbal and quantitative test scores separately for men and women in various age groups and years beyond the baccalaureate (statistical details may be found in Clark, 1984.) As a bench mark for comparison, the average scores of all test takers in this year were Verbal 485 and Quantitative 520. The mean verbal

scores of women age 30 or more were higher than the verbal scores of women age 22 or less; the mean verbal scores of the older age groups of men were slightly lower than the mean verbal score of the youngest group, but even for the men, the mean verbal scores of returning students were at or about the same level as the mean score of the youngest group.

Insert Figures 1 through 5 about here

An examination of Figures 2 through 5 indicates that the mean verbal scores of test takers planning graduate study in the humanities were about the same in each of the four age groups, were higher for older test takers planning graduate study in the social sciences, remained about the same across age groups for test takers planning to study in the biosciences and health fields, and were somewhat lower for older test takers planning graduate study in applied biology, engineering, or physical science fields.

The patterns of mean quantitative scores across curricular areas present a different picture. Though the levels of mean quantitative scores vary considerably--much higher in the physical and biological sciences than in the humanities and social sciences--in each group, there was a clear trend toward lower scores in the older age groups.

Figures 2 through 5 also include the mean verbal and quantitative scores of test takers 9-15 years and 16 or more

years beyond the bachelor's degree. In many cases, the mean verbal scores of the men and women who finished their undergraduate studies more than 16 years earlier were the highest of any age group. In general, both the mean verbal and mean quantitative scores of these groups parallel the within-field scores of men and women age 30-39 and 40 or more but at a slightly higher level. This finding is consistent with the status of these groups as highly self-selected adults who are returning to further study several years after completing their undergraduate degrees.

In summary, though there are some fluctuations in mean verbal scores across age groups within curricular areas, the patterns of scores indicate that examinees planning graduate study in similar fields average similar GRE Verbal test scores regardless of age. Undergraduates who complete the bachelor's degree at older ages (the "late bloomers") may tend to score somewhat lower, and the highly self-selected persons returning to study after several years away from academe (the "returners") tend to score higher than average on the verbal measure. In general, however, the conclusion is one of consistency across age groups and across number of years since the bachelor's degree for the GRE verbal measure. The results are very similar to those obtained in an earlier analysis of older student performance on the GRE (Hartle, Baratz, & Clark, 1983.)

The picture for the quantitative measure is similarly consistent, but different in that the mean scores are

progressively lower at each advancing age level. The overall difference between those age 22 or less and those age 40 or more was about 120 points or one standard deviation, and the difference was slightly larger for men than for women. The average quantitative scores of older test takers planning to study in the physical sciences were much higher than for candidates in any other curricular area, but even in these fields the average score for the oldest group was about 70 points below the average score for the youngest group.

The older examinees also reported somewhat lower undergraduate grade averages than the undergraduate grades reported by those age 22 or less, perhaps reflecting the national trend toward grade inflation and therefore higher cumulative grade averages for graduates in more recent years.

Predictive Validity of the GRE Scores

Though of similar levels, the test scores of different applicant groups might relate in different ways to actual performance in graduate study. This possibility was examined by analyzing test scores and undergraduate grade averages in relation to first-year graduate school grades in 170 departments that provided the ages of graduate enrollees along with other data to the GRE Validity Study Service. Four fields with substantial numbers of older enrollees (English, psychology, education, and nursing) were examined,

together with 8 clusters of departmental samples defined according to similarity of fields.

Consistent with the performance of GRE test takers reported earlier, the mean GRE verbal scores of the older students (30 and over) across all 170 departments were slightly higher than the verbal scores of the younger groups, while the mean quantitative scores averaged slightly lower for the older age groups. Undergraduate grade averages were lower in the older groups. There were very slight differences in the first-year graduate school grade averages in the different age groups, reflecting in part the very narrow range of graduate grades for almost all enrollees. For example, the 143 departments that reported first-year grades on a scale from 1.0 to 4.0 had a median grade average of 3.5, and only 2 departments reported a first-year grade average below 3.0.

Correlations between first-year grades and GRE verbal or quantitative scores averaged around .20 in all of the fields and age groups, with fluctuations that did not appear to show any consistent relationship to age. The correlations between undergraduate grades and first-year average did, however, show higher correlations for the younger age groups in almost every field.

Regressions were computed to obtain the best linear combination of the verbal and quantitative scores and of test scores plus undergraduate grades for each of the field groups. For the two test scores as predictors, the median

groups. For the two test scores as predictors, the median multiple R with first-year average was .28 with a range from .20 to .38 across the 12 groups of departments. The best fitting combination of three predictors produced a median multiple R of .35 with a range from .31 to .43. Group sizes for these validity coefficients ranged from 219 to 1,882. The coefficients are similar to those obtained in other predictive validity studies of the GRE General Test.

The relationship between verbal scores and first-year graduate grade average across disciplines and age groups was about the same in each age group, especially in the humanities and the social sciences. Similarly, the relationship between quantitative scores and first-year graduate grade average was about the same for each age group; however, there were no groups age 35 or more in the science fields that attach particular importance to quantitative scores. There was a declining relationship between undergraduate grades and first-year graduate grade average across age groups. Because of the declining utility of undergraduate grades, the combination of test scores and grades to predict first-year grade average worked slightly less well for the older two age groups than for the younger two groups. Basically, however, the data support the general conclusion that there are no sizeable differences in the coefficients of predictive validity for the GRE General Test scores of persons who begin graduate study at various ages.

Similarly, an investigation of the relative accuracy of prediction indicated that the obtained first-year grades of the older students were underpredicted slightly, due largely to the fact that their undergraduate grades were lower but their first-year graduate school grades were slightly higher than the same measures for the younger groups. However, the results did not suggest that the variation in accuracy of prediction across age groups was very great.

Test Repeaters and Attitudes Toward Test Taking

Changes in the test scores of examinees who take admissions tests on more than one occasion are of interest both to test takers and to those who evaluate and interpret test scores. The prospect of taking a test such as the GRE often is of particular concern to middle or older adults who have been away from school for a number of years, even though they may have taken one or more graduate admission tests when they were college seniors. To examine questions about test repeaters and the role of intervening experience on retest performance, a questionnaire was sent to 864 men and women who took the GRE General Test in June 1980 and who identified themselves as having taken the test before. The questionnaire sought information on (a) perceived factors that affected test-taking performances on each occasion, (b) intervening experiences that might relate to test score changes, and (c) reasons for retaking the test. Usable responses were received from 684 (73%) of the test repeaters. However, earlier test scores could be located

for only 433 (63%) of the questionnaire respondents, due primarily to uncertainties about the date of earlier testing, name changes for women who married, and other matching errors. Because of these difficulties, women and older test takers were over-represented in the group for whom no second test score could be found. Black test takers were intentionally oversampled when selecting the sample, resulting in a relatively large proportion of Blacks (21% vs. 7% among all test takers) in the analyses. Details of the study have been reported by Powers and Clark (1985).

The results of this study were quite similar for Blacks and Whites; therefore, the data are not presented separately. However, because the test scores of Black test takers were about one standard deviation below the average scores for White test takers, the mean "Previous" and "Recent" GRE scores reported here are lower (by nearly 30 points) than if Black test takers had not been oversampled. A comparison of the primary study sample with all 1979-80 GRE test takers is presented in Table 1, including a comparison of average earned test scores for the various groups. As has been found to be the case in other studies (e.g., Rock & Werts, 1980,) the "Previous" scores of repeaters were below the mean of all test takers. However, considering the different mixes, it appears that the sample of repeaters earned similar or slightly higher verbal and analytical retest scores when compared to all 1979-80 test takers, and only slightly lower quantitative scores.

Insert Table 1 about here

Patterns of average GRE scores by length of time between tests are reported in Table 2. For all three tests, and even after long periods of time, on the average the second test scores were higher than the first. In fact, larger average increases in verbal scores occurred for time intervals longer than three years, while the larger average increases in quantitative scores occurred in the shorter time intervals. These results suggest that, as Rock and Werts (1980) noted, verbal scores may increase with the everyday acquisition of verbal knowledge, but quantitative ability/achievement is less likely to improve with the simple passage of time. Also, those electing to retake the test after three years or more had higher previous verbal and quantitative scores than did those who were repeating sooner, suggesting that the older repeaters were a more highly self-selected group.

Insert Table 2 about here

When asked why they had retaken the test, most persons repeating within three years said they retested to improve their test scores while most of those repeating after longer periods of time did so at the request of a graduate school.

According to current GRE program policy, scores will be reported for up to 20 years but a cautionary note is included with any report that contains test scores more than five years old. Thus, it is not surprising to find persons who repeated after several years reporting that they needed more recent scores. Also, apparently some of the older or returning students retook the exams at least partially for self-evaluation purposes--out of "curiosity" to assess the effects of thought-to-be relevant intervening experiences (e.g., "to see if more education and experience improves scores"), and maturation (e.g., to "prove to myself that being older (57) may be slower, but not dumber").

When asked about activities between testing that might have affected their test scores, the older repeaters particularly mentioned graduate study and employment that included extensive reading and writing. Examinees also volunteered that they had engaged in a wide variety of other relevant pursuits including extensive travel, teaching/counseling, and community involvement. By far the most frequently mentioned influence was reading, usually as either a leisure time activity or a planned activity to increase particular skills. None of these activities, however, or any indices based on composites of them, correlated significantly with score changes for any section of the test.

When asked about factors related to the tests or the test-taking experience that might have affected their

scores, the responses of all age groups were very similar. Lack of familiarity with specific types of question formats, lack of adequate review of subject matter, and slowness were perceived by examinees as being the most influential factors on both initial testing and retesting. No factor was seen as becoming more bothersome on retesting than on initial testing. Some factors, such as "sickness" or "personal problems" or "poor testing conditions", were not perceived as very important on either occasion. There was some tendency for those repeating after long periods of time to report spending less time preparing for the tests; repeaters attempting to improve their scores reported more time in review and more use of study aids.

Older test repeaters frequently mentioned the time lapse between tests as a likely factor in score differences. Typical comments regarding expectations were:

> I haven't done any math for the 10 years between tests and really found it too boring to review much. I expect my verbal score to be higher now simply because of 10 more years on earth.

> [with regard to verbal activities] I've been doing crossword puzzles, reading magazines . . . but math-wise I've done nothing beyond balancing my checkbook.

Women were somewhat more likely than men to mention personal circumstances such as as carelessness, tiredness, personal problems, or nervousness as important factors in test performance. "Slowness" was mentioned with equal frequency by both women and men.

None of the correlations between examinees' assessments of the effects of various factors and test score changes were high enough to be useful in explaining test score variance. However, correlations among the factor items suggested the presence of a "test preparation" cluster that was stronger on the previous test occasion than on the more recent testing. This finding is consistent with the observation that, when compared with examinees from the same test administration who were not repeating the test, the test repeaters reported spending about 20% more time preparing for each section of the test.
Several mentioned the relatively recent GRE program emphasis on providing more extensive test familiarization materials as helpful in preparing for the tests.

Returning test takers also frequently mentioned increased maturity and emotional stability as factors in improved test performance. For many, this maturity seemed to be accompanied by a greater sense of purpose and perspective. Apparently, some examinees were able to take the exams more seriously upon retesting.

Throughout test takers' comments, one of the most frequently mentioned factors was time since receipt of an undergraduate degree, time since previous testing, or simply age. Perhaps one reason for the difficulty in being able to specify any of the factors identified in the research as actual causes of test score gains or losses is that different examinees sometimes gave the same explanation for

gains as others gave for decreases. For example, the better perspective and increased motivation that came with age was also seen as being accompanied by a decay in general test taking skills or in specific quantitative skills. For some examinees, the time between tests apparently enabled significant reading and personal development that was viewed as a positive influence on test scores; other test takers described the same period of time as involving so little intellectual stimulation that no improvement in abilities or test scores could reasonably be expected.

Summary and Recommendations

The major conclusion of this research is that early and middle adults who take the GRE General Test earn verbal ability scores that are very similar to the scores of younger applicants interested in the same fields of graduate study, while average Quantitative scores are lower for test takers age 30 or older than for those age 20-22 in almost every field. Both scores predict first-year graduate school grades with approximately equal accuracy for all age groups. (For the most part, Analytical scores were not investigated because the test was being revised at about the time these data were collected.) The schools or departments that are most likely to receive the GRE scores of older test takers include education, psychology, nursing, business, social work, computer science, library science, English, and religious studies.

In relation to graduate admission decisions, there appears to be little support for the notion that verbal scores should be interpreted differently when making admission decisions for older applicants. In fact, the results suggest that test scores may be increasingly useful in predicting the graduate school performance of older applicants as the time interval between undergraduate and graduate study increases and the usefulness of the undergraduate grade average declines. It is not safe to assume that a candidate will do poorly on the GRE General Test simply because she or he has been away from formal academic study for a number of years.

First year graduate grades are predicted only partially by the traditional admission criteria of test scores and undergraduate grades, regardless of the ages of the graduate students. Other characteristics and experiences of applicants should be considered when making all admissions decisions; it is especially important to consider factors in addition to test scores and undergraduate grades when deciding upon the admission of an older applicant who is returning to graduate study after several years away from academe.

The study of test repeaters and their reactions to the test-taking experience suggests that the importance of preparing for the test might be emphasized more strongly with test registrants. Among the repeaters, preparation for the test seemed more closely related to score changes than

any other factor that was investigated. These results suggest that lack of preparedness is something that examinees apparently feel they can overcome upon retesting. Being better prepared may reduce the extraneous variation in test scores due to facility with test-taking procedures; if so, retest scores might reasonably be expected to yield more valid predictions of future academic performance than would initial scores.

Finally, a general finding was that examinees have definite opinions about discrepancies between multiple sets of test scores, and these opinions are systematically though rather weakly related to test performance. This suggests that it might be helpful for graduate admission applicants to share these opinions with graduate admission committees, and for the admissions committees to seek such opinions when confronted with discrepant multiple test scores. Such an exchange might have potential not only for explaining test score changes, but also for providing other interesting information about applicants that might not otherwise be gleaned from personal statements or application forms.

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Figure 1

GRE Scores by Age and Sex
1980-1981

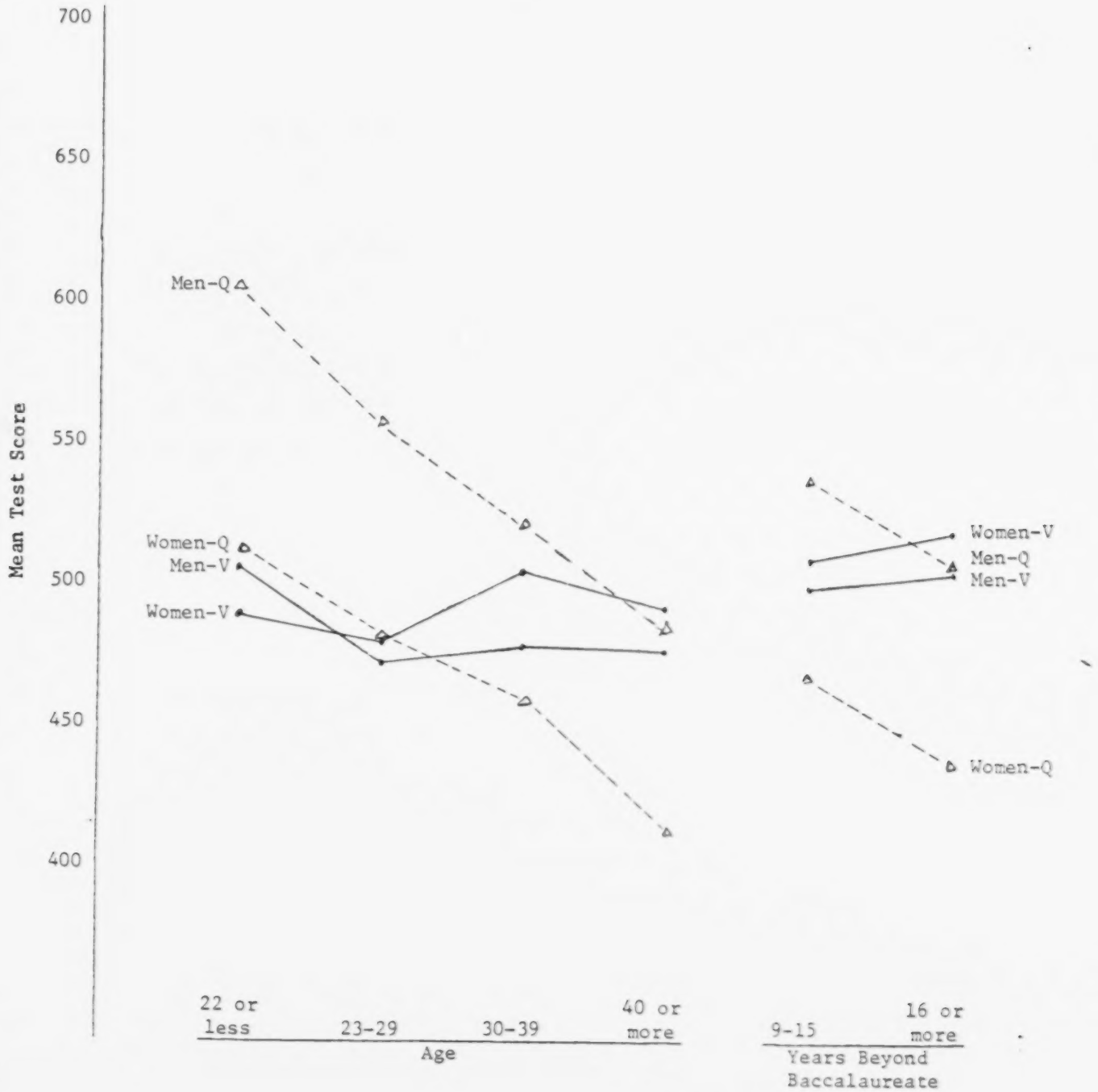

Figure 2

Humanities Fields:
Mean Test Scores by Age and Years
Since Baccalaureate

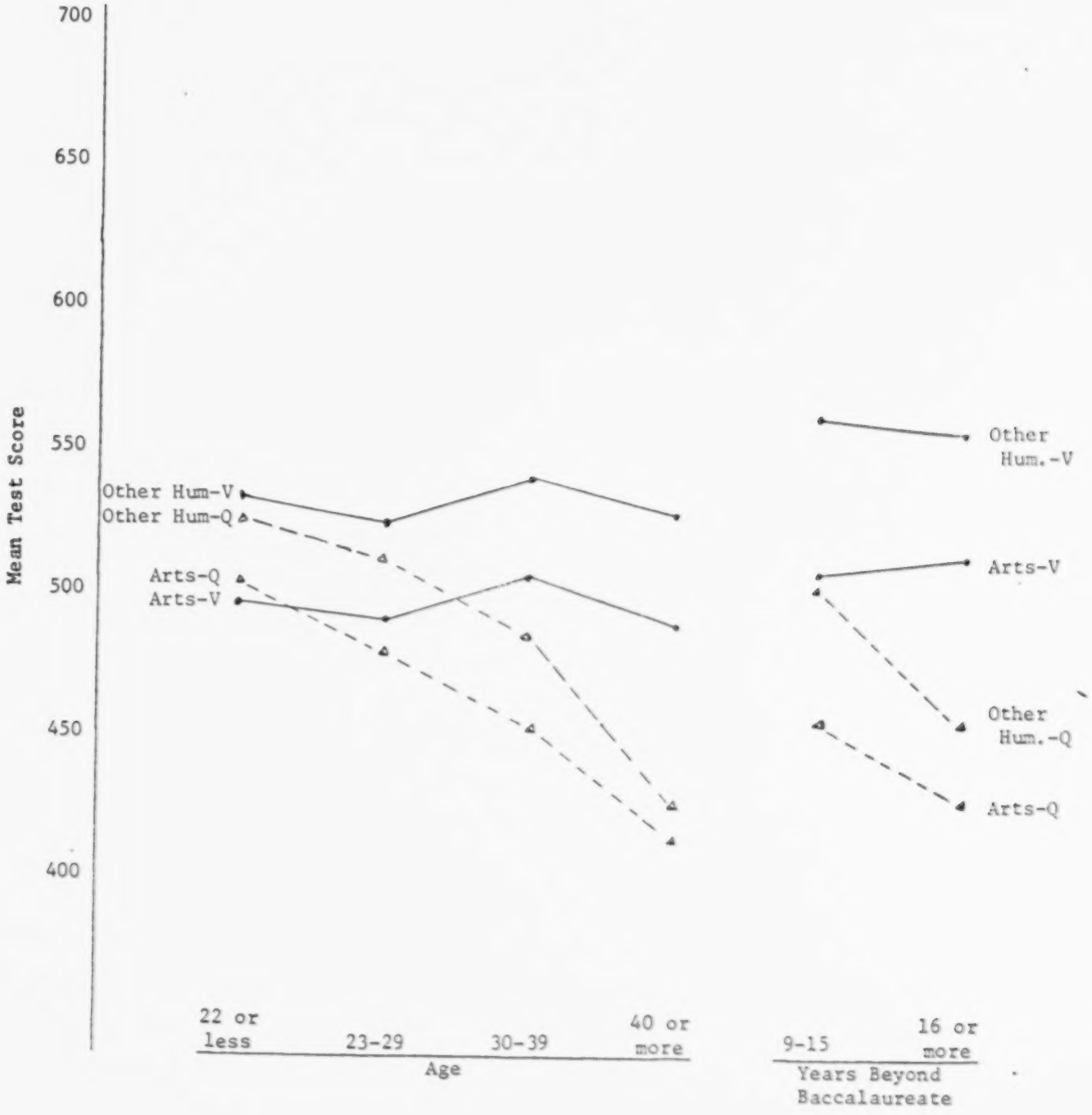

Figure 3

Social Science Fields:

Mean Test Scores by Age and Years

Since Baccalaureate

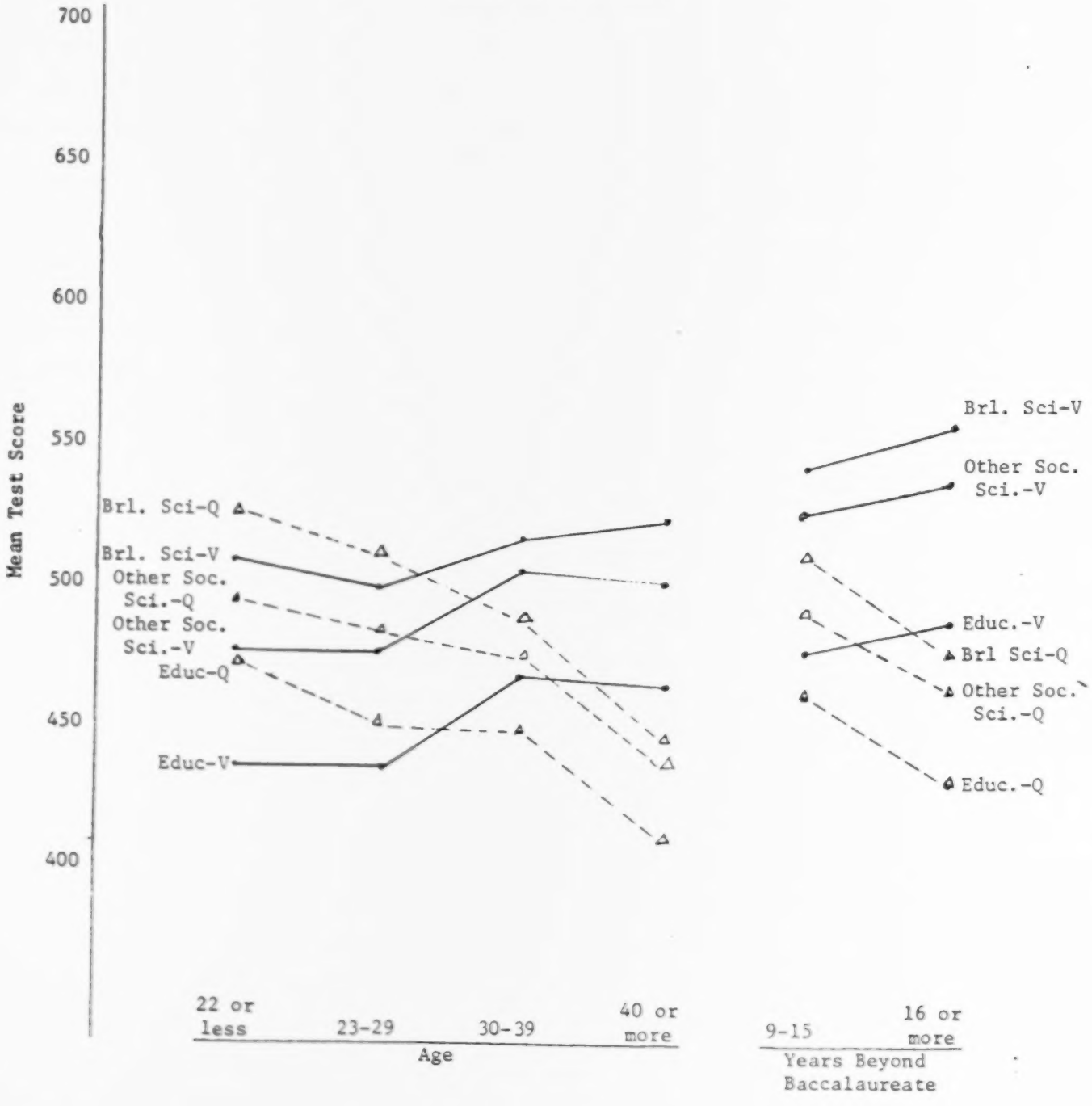

Figure 4

Biological Sciences Fields:
Mean Test Scores by Age and Years
Since Baccalaureate

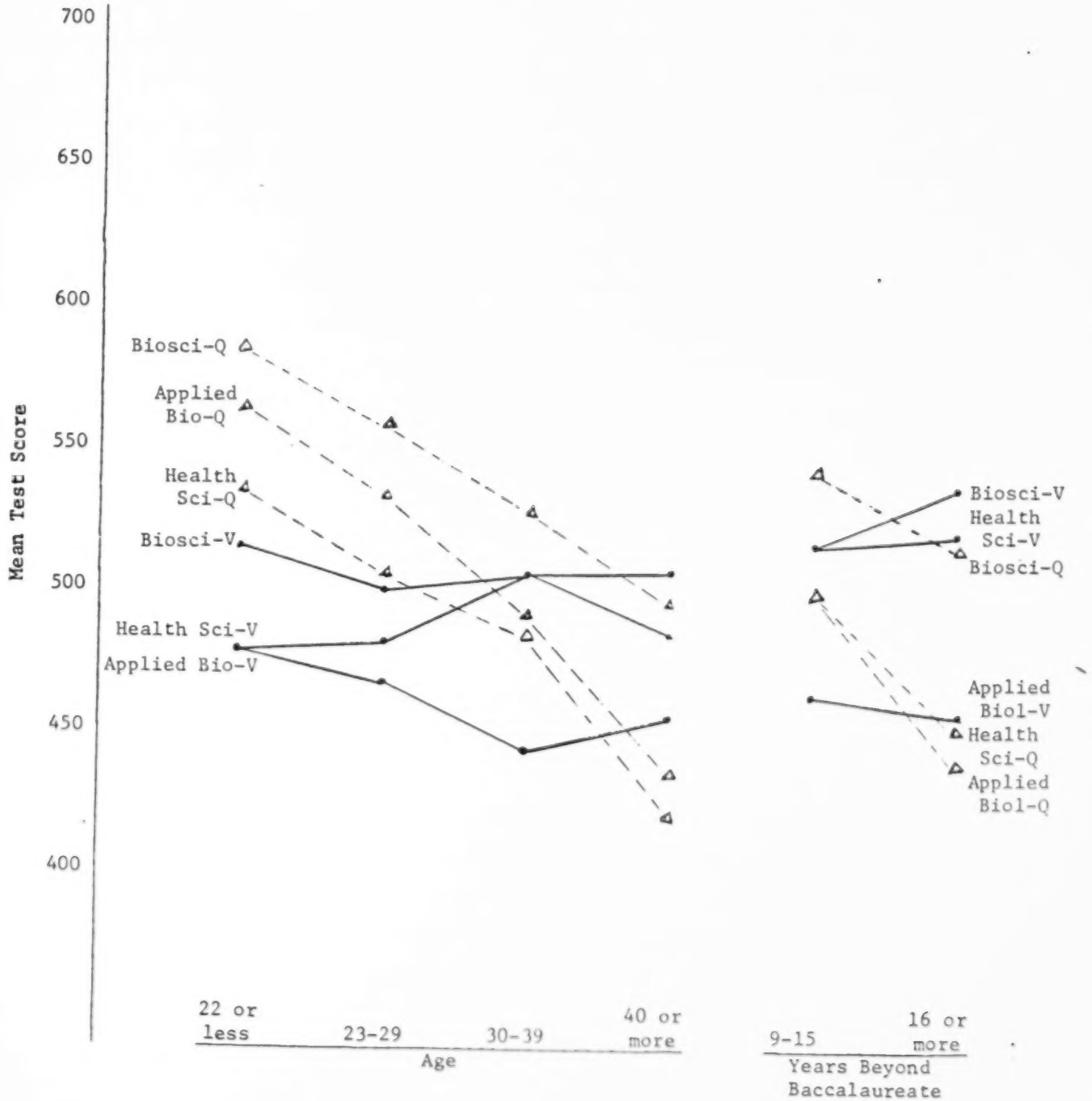

Figure 5

Physical Science Fields:
Mean Test Scores by Age and Years
Since Baccalaureate

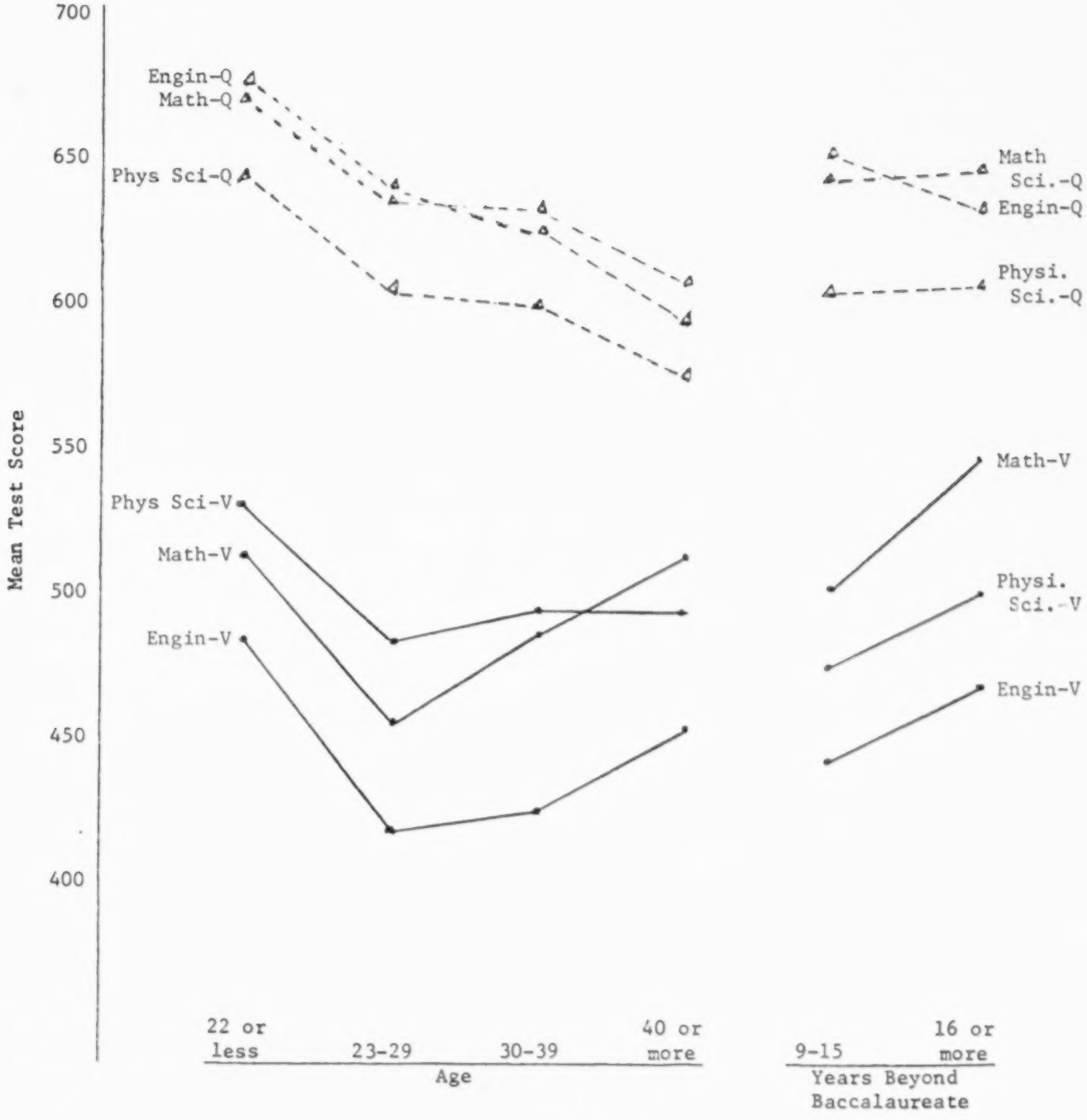

Table 1

Comparison of Study Sample with All GRE Test Takers

Variable		All 1979-80 GRE Test Takers[a] (N = 210,000)	Primary Study Sample (N = 433)	
Undergraduate Field (%)				
Humanities		15.4	14.0	
Social Sciences		42.9	48.8	
Biological Sciences		31.8	27.0	
Physical Sciences		17.1	10.2	
Sex (% female)		53.6	51.0	
Racial Identification				
Black		6.7	21.1	
White		86.3	79.0	
Other		7.0	0.0	
Degree Objective				
Nondegree		0.9	0.2	
Master's or intermediate		62.7	46.6	
Doctorate or postdoctoral study		36.3	53.1	
GRE Scores			Previous	Recent
Verbal	M	487	453	484
	SD	123	118	127
Quantitative	M	516	460	478
	SD	131	131	131
Analytical[b]	M	508	438	500
	SD	127	124	130
English Best Language (%)		92.4	95.4	
Year of Receipt of Bachelor's Degree				
1969 or earlier		7.8	14.7	
1970 - 1974		11.6	26.4	
1975 - 1979		38.0	45.7	
1980 or later		42.7	13.3	

[a]Source: Wild, C. L. A summary of data collected from Graduate Record Examinations test-takers during 1979-80. Data Summary Report #5. Princeton, N.J.: Educational Testing Service, 1981.

[b]Based on analytical scores earned before the analytical measure was revised in October 1981.

Table 2

Patterns of Average GRE Scores by Length of Time Between Tests

Test Score		Time Between Tests: Less than 6 months (N=57)	6 months-2 years (N=168)	3 - 8 years (N=155)	9 years or more (N =53)
Verbal	June 1980	431	450	521	536
	Previous	413	422	488	491
	Difference	18	28	33	45
Quantitative	June 1980	451	475	476	492
	Previous	437	444	470	482
	Difference	14	31	06	10
Analytical	June 1980	480	500		
	Previous	435	439		
	Difference	45	61		

Note. The analytical section was first given in 1977; therefore, very few members of the sample were repeating the test after three years or more.